



5 **IHE Quality, Research and Public Health
Technical Framework Supplement**

10 **Aggregate Data Exchange
(ADX)**

15 **Trial Implementation**

20 Date: August 27, 2015
Author: QRPH Technical Committee
Email: qrph@ihe.net

25 **Please verify you have the most recent version of this document. See [here](#) for Trial Implementation and Final Text versions and [here](#) for Public Comment versions.**

Foreword

30 This is a supplement to the IHE Quality, Research and Public Health (QRPH) Technical Framework V0.1. Each supplement undergoes a process of public comment and trial implementation before being incorporated into the volumes of the Technical Frameworks.

This supplement is published on August 27, 2015 for trial implementation and may be available for testing at subsequent IHE Connectathons. The supplement may be amended based on the results of testing. Following successful testing it will be incorporated into the Quality, Research
35 and Public Health Technical Framework. Comments are invited and can be submitted at http://www.ihe.net/QRPH_Public_Comments.

This supplement describes changes to the existing technical framework documents.

“Boxed” instructions like the sample below indicate to the Volume Editor how to integrate the relevant section(s) into the relevant Technical Framework volume.

40

<i>Amend Section X.X by the following:</i>
--

Where the amendment adds text, make the added text **bold underline**. Where the amendment removes text, make the removed text **~~bold strikethrough~~**. When entire new sections are added, introduce with editor’s instructions to “add new text” or similar, which for readability are not bolded or underlined.

45

General information about IHE can be found at: www.ihe.net.

Information about the IHE QRPH domain can be found at: http://www.ihe.net/IHE_Domains.

Information about the organization of IHE Technical Frameworks and Supplements and the process used to create them can be found at: http://www.ihe.net/IHE_Process and
50 <http://www.ihe.net/Profiles>.

The current version of the IHE QRPH Technical Framework can be found at:
http://www.ihe.net/Technical_Frameworks.

55

CONTENTS

	Introduction to this Supplement.....	5
	Open Issues and Questions	5
60	Closed Issues	5
	General Introduction	7
	Appendix A – Actor Summary Definitions	7
	Appendix B – Transaction Summary Definitions.....	7
	Glossary	7
65	Volume 1 –Profiles	8
	Copyright Licenses.....	8
	Domain-specific additions	8
	X Aggregate Data Exchange (ADX) Profile	9
	X.1 ADX Actors, Transactions, and Content Modules.....	10
70	X.1.1 Actor Descriptions and Actor Profile Requirements.....	11
	X.1.1.1 Content Data Structure Creator	11
	X.1.1.2 Content Creator.....	11
	X.1.1.3 Content Consumer	11
	X.2 ADX Actor Options	12
75	X.3 ADX Required Actor Groupings	12
	X.4 ADX Overview	12
	X.4.1 Concepts	14
	X.4.2 Use Cases	15
	X.4.2.1 Use Case #1: Community health workers filing routine reports	15
80	X.4.2.1.1 Community health workers filing routine reports: Use Case Description. 15	
	X.4.2.2 Use Case #2: Reporting health worker data	15
	X.4.2.2.1 Reporting health worker data Use Case Description	15
	X.4.2.3 Use Case #3: Routine reporting from EMR	16
	X.4.2.3.1 Routine reporting from EMR: Use Case Description.....	16
85	X.4.2.4 Use Case #4: Reporting data from HMIS to Other Aggregate Data Repositories	18
	X.4.2.4.1 Reporting national data from HMIS: Use Case Description	18
	X.5 ADX Security Considerations.....	18
	X.6 ADX Cross Profile Considerations	19
90	Appendices.....	20
	Volume 2 – Transactions	21
	Appendices.....	22
	Volume 2 Namespace Additions	22
	Volume 3 – Content Modules.....	23
95	5 Namespaces and Vocabularies.....	24
	6 Content Modules.....	25
	7 Content Modules.....	26

	8 ADX Content Modules	27
	8.1 Overview of ADX process	27
100	8.2 The Data Structure Definition (DSD)	27
	8.2.1 ADX DSD constraints	27
	8.2.1.1 Top level structure	28
	8.2.1.2 Codelists	28
	8.2.1.3 Concepts	29
105	8.2.1.4 DataStructures	30
	8.2.1.4.1 Dimensions	31
	8.2.1.4.2 The TimeDimension	32
	8.2.1.4.3 Dimension grouping	33
	8.2.1.4.4 The measure dimension	34
110	8.3 Generating the schema for an ADX data payload.....	34
	8.4 ADX Message Exchange Constraints (Informative).....	34
	Appendices to Section 8.....	36
	Appendix 8A – (Normative) Schematron constraining ADX/DSD.....	36
	Appendix 8B – (Normative) XSLT to generate ADX/XSD schema from DSD	40
115	Appendix 8C – (Informative) DSD pre-processor to resolve external references	45
	Appendix 8D – (Normative) ADX Mandatory ConceptScheme	46
	Appendix 8E – (Informative) Sample ADX DSD	47
	Appendix 8F – (Informative) Generated sample ADX data schema	52
	Appendix 8G – (Informative) Sample ADX/XML data	54
120	Appendix 8H – (Informative) Formatting of times and time intervals in ADX	56
	Volume 3 Namespace Additions	57
	Volume 4 – National Extensions	58

125 Introduction to this Supplement

The Aggregate Data Exchange (ADX) Profile defines the structure of ADX/XML messages to be exchanged between a Content Creator and a Content Consumer. ADX introduces a new actor: the Content Data Structure Creator. The Content Data Structure Creator defines the structural metadata (e.g., code lists for dataElements) to be used in the message exchange. The message structure definition files created by the Content Data Structure Creator may be employed by a Content Creator to construct and exchange interoperable, ADX-conformant messages with a Content Consumer.

The ADX Profile has been developed to support interoperable public health reporting of aggregate health data. The need for this profile arises from the fact that data is currently being exchanged using a variety of formats which are not formally described. The aim of ADX is to describe the development of lightweight, formal message structures which meet the requirements of the use cases in context.

This specification profiles an SDMX v2.1 Data Structure Definition (DSD) to normatively describe the structure of routine aggregate data reports as XML. This is a message structure profile; specification of the message transmission is out of scope. Because of this, actor groupings are not defined.

Open Issues and Questions

There is some overlap in the aims with QRDA. We need to justify and explain.

Closed Issues

145 Maybe we have to create new actors if Content Creator/Content Consumer do not fit.

RESOLUTION: A new actor has been defined: the Content Data Structure Creator.

Placing dimensions at the dataset or data row level requires further discussion.

RESOLUTION: For ADX mandatory dimensions, orgUnits and period dimensions shall be placed at the dataset level and dataElement dimension shall be placed at the data row level.

150 CSV format may be considered too low a bar for profiling. It should not be at the same conformance level as the other two.

RESOLUTION: CSV format has been dropped from the profile.

SDMX v2.1 describes and xml and CSV rendition of the data. It doesn't currently describe a json rendition. There is considerable pressure from implementers to support json. Should we incorporate a mapping in an informative appendix?

155

RESOLUTION: Only XML formats are normatively defined.

SDMX 2.0 vs 2.1: version 2.0 is the most widely adopted version of SDMX, but it is 2.1 which is published by ISO. V2.0 is published by the SDMX consortium.

RESOLUTION: Because it is the version balloted by ISO, ADX profiles SDMX v2.1.

160

General Introduction

Update the following appendices to the General Introduction as indicated below. Note that these are not appendices to Volume 1.

Appendix A – Actor Summary Definitions

165 *Add the following actors to the IHE Technical Frameworks General Introduction list of actors:*

Actor	Definition
Content Data Structure Creator	The Content Data Structure Creator creates a message structure definition that may be employed by a Content Creator to develop profile-conformant messages for exchange with a Content Consumer.

Appendix B – Transaction Summary Definitions

Add the following transactions to the IHE Technical Frameworks General Introduction list of Transactions:

170 No new transactions.

Glossary

Add the following glossary terms to the IHE Technical Frameworks General Introduction Glossary:

No new glossary terms.

175

Volume 1 –Profiles

Copyright Licenses

NA

Add the following to the IHE Technical Frameworks General Introduction Copyright section:

180 **Domain-specific additions**

NA

Add Section X ...

185 **X Aggregate Data Exchange (ADX) Profile**

The Aggregate Data Exchange (ADX) Profile enables interoperable public health reporting of aggregate health data. ADX will typically be used to represent routinely reported aggregate data such as the numerators and denominators which can be used in the construction of public health indicators.

190 The central concern of an ADX is the reporting of data tuples. These tuples are sets of values which are keyed according to a dataElement subject, a temporal dimension, and a spatial dimension. An example data tuple is the number of live births recorded in January 2015 at Nyamandhlovu Clinic.

195 Aggregate health dataElements are defined in an implementing jurisdiction, e.g., a single health facility or a geographic/administrative area such as district, province or country, and are currently being exchanged using a variety of ad-hoc and application-specific formats which are not formally described.

200 ADX defines a Content Data Structure Creator Actor that creates two message structures that enable an implementing jurisdiction to formally define the aggregate health data to be exchanged:

1. ADX profiles the SDMX v2.1 Data Structure Definition (DSD) specification
2. ADX normatively describes how a DSD file is transformed to develop an XML schema definition (XSD) file

205 The DSD and XSD describe lightweight, formal XML messages containing aggregate health data that meet the requirements of the use cases in the implementing jurisdiction.

ADX Content Creator and Creator and Consumer Actors use the DSD and XSD to construct and exchange ADX/XML messages containing aggregate health data in their jurisdiction.

210 The ADX Profile contains few constraints regarding the nature and source of coding systems, and there are liberal extension points intended to allow ADX content to be embedded within different envelopes and its message attributes extended in locally-meaningful ways.

In summary:

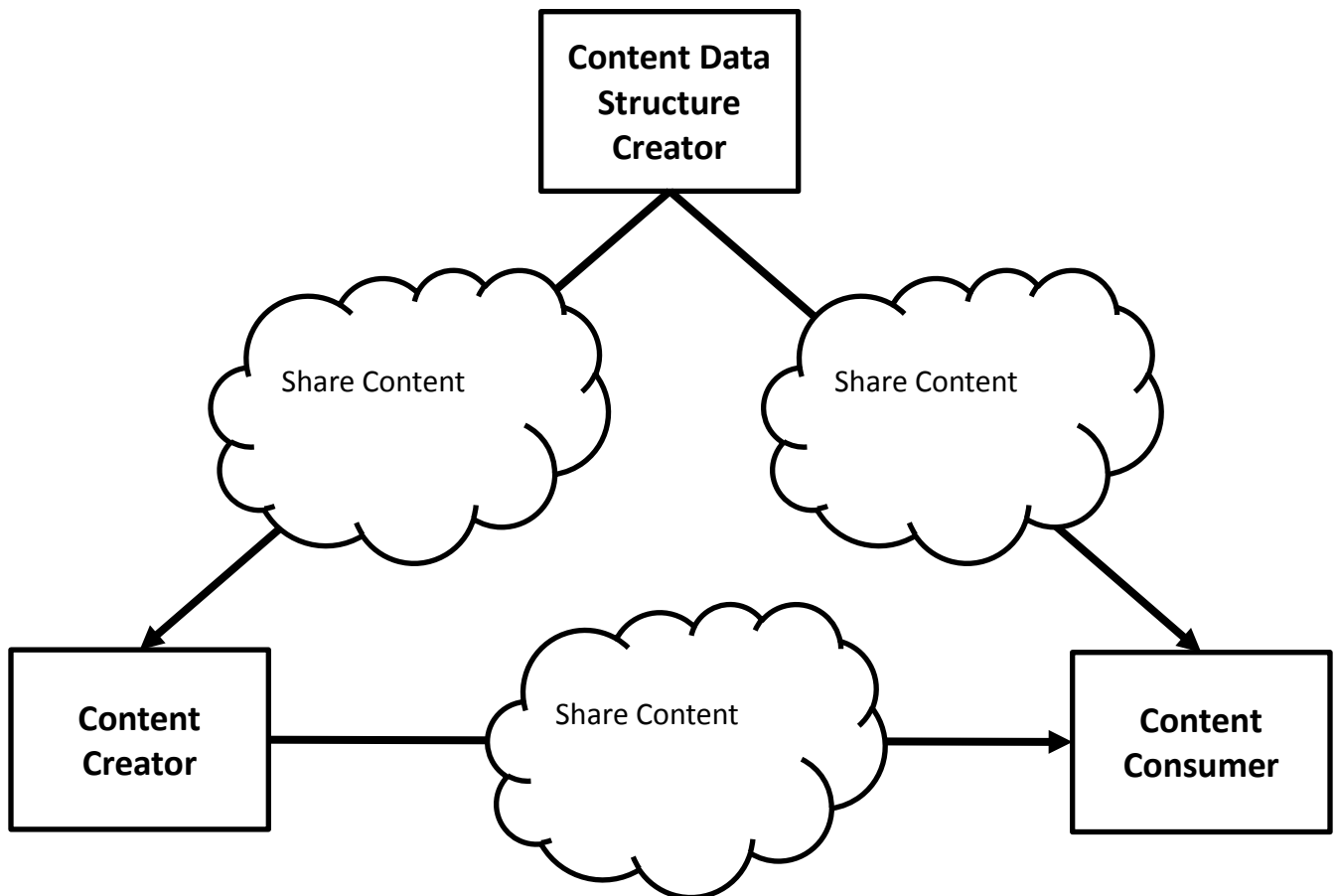
- 215 • The ADX Profile defines the process for a Content Data Structure Creator to develop an SDMX-conformant DSD which describes the base constraints for a valid ADX XML data message. Individual jurisdictions will extend the DSD by specifying relevant codelists and additional dimensions of data to satisfy their message exchange use cases.
- The ADX Content Data Structure Creator transforms the resulting DSD into an XML schema definition (XSD) file.
- 220 • An ADX Content Creator and Content Consumer then exchange ADX-conformant XML messages that are conformant with the structure described by the ADX-conformant XSD and DSD files.

The method of exchange between a Content Creator and a Content Consumer of ADX-conformant XML messages is not constrained by this profile (e.g., an implementing jurisdiction may choose to use SMS for Content Creators and Content Consumers to exchange ADX/XML containing their aggregate health data).

225 **X.1 ADX Actors, Transactions, and Content Modules**

This section defines the actors, transactions, and/or content modules in this profile. General definitions of actors are given in the Technical Frameworks General Introduction Appendix A at http://ihe.net/Technical_Frameworks.

230 Figure X.1-1 shows the actors directly involved in the ADX Profile and the direction that the content is exchanged. Although the Content Creator employs the message structure definition files that result from a Content Data Structure Creator, there is not a message exchange transaction, per se, between these actors.



235 **Figure X.1-1: ADX Actor Diagram**

Table X.1-1 lists the content module(s) defined in the ADX Profile. To claim support for this profile, an actor shall support all required content modules (labeled “R”) and may support optional content modules (labeled “O”).

240

Table X.1-1: ADX Profile - Actors and Content Modules

Actors	Content Modules	Optionality	Reference
Content Data Structure Creator	ADX/DSD	R	QRPH TF-3: Sec 8.2-8.3, App. 8A, 8E
	ADX/XSD	R	QRPH TF-3: Sec 8.2-8-3, App. 8B, 8F
Content Creator	ADX/XML	R	QRPH TF-3: App 8G
Content Consumer	ADX/XML	R	QRPH TF-3: App 8G

X.1.1 Actor Descriptions and Actor Profile Requirements

X.1.1.1 Content Data Structure Creator

245 A Content Data Structure Creator defines the structure of XML data to be exchanged between a Content Creator and Content Consumer. Typically, the Content Data Structure Creator will be an implementing jurisdiction such as a ministry of health, a global non-government organization (NGO) or a donor.

A Content Data Structure Creator shall create two normative message structure definition files.

- 250
1. an SDMX v2.1-conformant Data Structure Definition (DSD) file conformant to the normative ADX schematron specification (see QRPH TF-3: 8.2 and Appendix 8A)
 2. a W3C-conformant XML Schema Definition (XSD) file matching the result generated by the normative XSLT transform from DSD to XSD (see QRPH TF-3: 8.3 and Appendix 8B).

255 Informative examples of the DSD and XSD are included in QRPH TF-3: Appendices 8E and 8F.

X.1.1.2 Content Creator

A Content Creator shall be able to generate an XML file that is conformant to the schema defined by the DSD and XSD files produced by the Content Data Structure Creator.

X.1.1.3 Content Consumer

260 A Content Consumer shall be able to process an XML file that is conformant to the schema defined by the DSD and XSD files produced by the Content Data Structure Creator and persist it in such a way that each tuple of the XML file may be individually accessed.

X.2 ADX Actor Options

265

Table X.2-1: ADX - Actors and Options

Actor	Option Name	Reference
Content Data Structure Creator	No options defined	--
Content Creator	No options defined	--
Content Consumer	No options defined	--

X.3 ADX Required Actor Groupings

There are no Required Actor Groupings defined.

X.4 ADX Overview

270

ADX defines the normative process used to develop a simple message structure for representing aggregate health data.

275

The ADX message structure is defined using a Data Structure Definition (DSD) file conformant to the Statistical Data and Metadata Exchange (SDMX v2.1) specification. SDMX v2.1 is defined in ISO 17639:2013(E). ADX profiles this ISO standard; it constrains the SDMX specification and articulates how an ADX-conformant DSD is developed. The XML schema definition (XSD) for exchanged messages is generated from the DSD via a normative transformation.

280

This profile sets constraints on the mandatory dimensions which shall be in a DSD. Additional data element dimensions may be defined as necessary within the context of use - for example, within a particular country or implementing jurisdiction. Similarly, whereas ADX assumes that codelists and other structural metadata will be exchanged between Content Creators and Content Consumers, the content of that structural metadata is out of scope for ADX and shall be defined by the jurisdictional bodies governing the data exchange. These inputs to the ADX message schema definition are conceptually illustrated by Figure X.4-1.

285

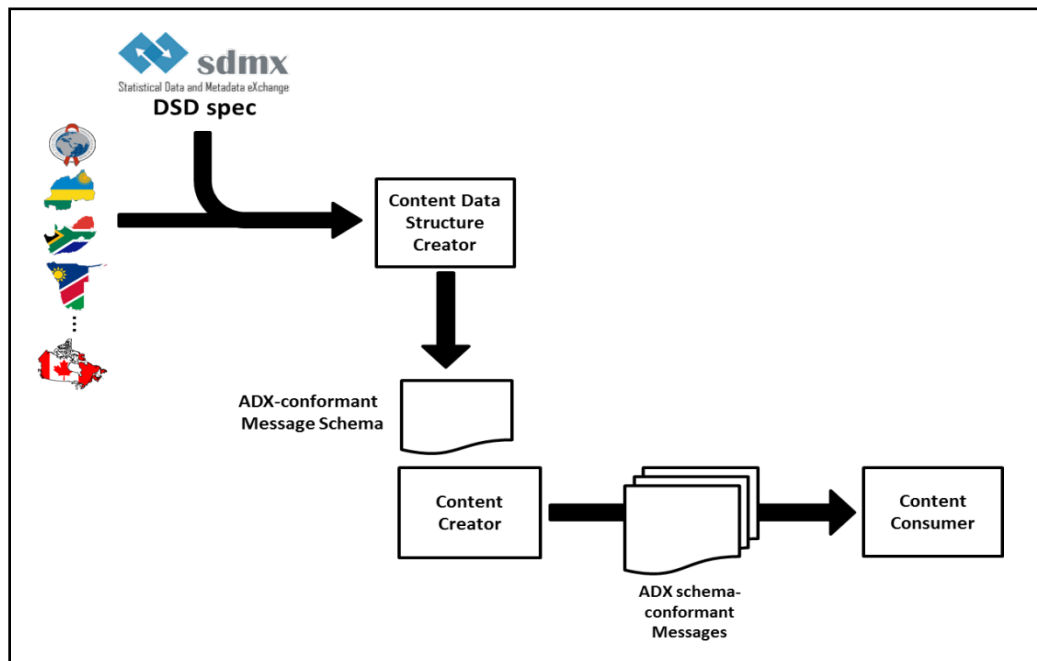
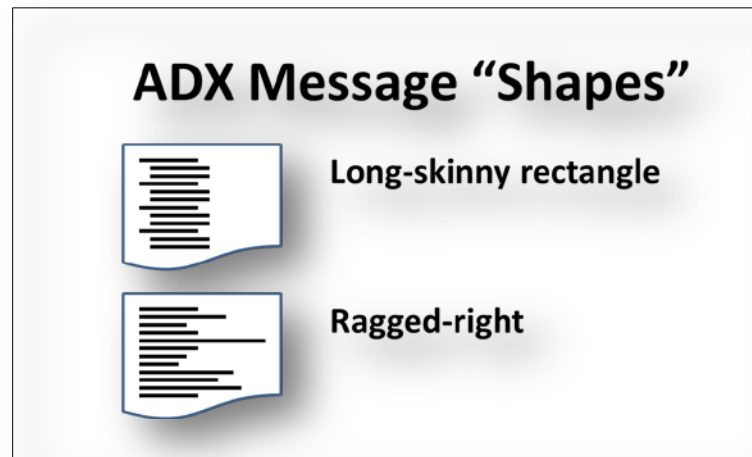


Figure X.4-1: An illustration of ADX Profile inputs and outputs

290 The shape of aggregate data reports can be different, as illustrated in the use cases in Section
X.4.2. In some cases the data is “rectangular” (all data rows share the same dimensionality). In
other cases, where the electronic data must model a complex paper form (for example), some
dataElements are disaggregated differently from others, leading to a “ragged-right” shape.
Rectangular datasets are shaped “long and skinny”; for each combination of organization unit
295 (typically a “facility”) and time period, there will be a list of data element and value pairs.
Ragged-right messages, on the other hand, may have tuples of differing widths depending on
whether disaggregation attributes have been specified for the data element (e.g., number of
malaria cases, disaggregated by gender and by age range). These two characteristic message
shapes are illustrated in Figure X.4-2.

300



305 **Figure X.4-2: ADX Message Shapes**

In summary:

- The ADX Profile defines the process for a Content Data Structure Creator to develop an SDMX-conformant DSD which describes the base constraints for a valid ADX XML data message. See QRPH TF-3: 8.2
- Individual jurisdictions will extend the DSD by specifying relevant codelists and additional dimensions of data to satisfy their message exchange use cases.
- The ADX Content Data Structure Creator transforms the resulting DSD into an XML schema definition (XSD) file. See QRPH TF-3: 8.3
- An ADX Content Creator and Content Consumer then exchange ADX-conformant XML messages that are conformant with the structure described by the ADX-conformant XSD and DSD files.

X.4.1 Concepts

The following concepts are used in this profile:

320 **Data Structure Definition (DSD):** a formal SDMX v2.1 definition of the structural metadata of an ADX message.

Data value: a reported value with its associated keys

Data Value Set: a collection of data values conforming to the ADX DSD.

325 **Data element:** the atomic subject of data collection such as “number of bed nets distributed”, “number of confirmed malaria cases”, “number of midwives”. This concept is required for the construction of public health indicators, but is not in itself an indicator.

330 **Organization Unit:** the spatial dimension of the data value tuple. It can identify a single health facility or a geographic/administrative area such as district, province or country. Within a national reporting structure, an organization unit represents a single node in a reporting hierarchy.

Time: the temporal dimension of the data value tuple. For routine data this would represent a time period such as the month of January 2015, the ISO8601 week number 3 of 2015, or the year 2015.

Value: the recorded value which is keyed in the data value tuple.

335 **X.4.2 Use Cases**

X.4.2.1 Use Case #1: Community health workers filing routine reports

X.4.2.1.1 Community health workers filing routine reports: Use Case Description

340 An Auxiliary Nurse Midwife (ANM) in an Indian state uses a simple SMS message to report 40 simple aggregate data elements. These are reported monthly and some of the more critical ones also daily. For example

- Number of ANY new cases registered
- Number of children given full immunization

345 These are all related to mother and child health services provided by the sub center and either in her clinic or outreach. She would take these numbers from her register. The data elements are all simple without further disaggregation.

350 The SMS message is sent to a gateway system, which (today) pushes the aggregate data report into the state level Health Management Information System (HMIS) system using a proprietary format. In the future state, the ADX Content Data Structure Creator defines the structure of the mother and child data to be exchanged, and the gateway system acts as an ADX Content Creator to produce these reports in a format which can be readily consumed by an ADX Content Consumer.

For ADX messages sent from the gateway that relate to a particular ANM for a particular time period, this message exchange would be a potential example of the “long skinny” rectangular shape.

355 **X.4.2.2 Use Case #2: Reporting health worker data**

X.4.2.2.1 Reporting health worker data Use Case Description

360 In Sierra Leone the two systems central to the management of the health system are the national HMIS and the human resource system, or health worker registry (HWR). A routine human resource report is reported by the health facility every six months. The reports consist of counts of health worker cadre’s working at the facility (number of doctors, nurses, community health

workers etc.). There is an additional disaggregation on all report rows which indicates the salaried status of the employee.

365 This data could instead be extracted directly from the health worker registry and represented as an ADX summary report to be consumed by the national HMIS. The benefits of doing this can be either to reduce the reporting burden at the facility by replacing the manual data entry or to supplement it by acting as a control to detect staffing anomalies. The report extracted from the health worker registry would contain data for a single time period but for multiple health facilities.

370 In this use case, the ADX Content Data Structure Creator defines the structure of the human resource report, the health worker registry acts as an ADX Content Creator, and the national HMIS is a Content Consumer.

X.4.2.3 Use Case #3: Routine reporting from EMR

This use of ADX enables generation and reporting of aggregate data from EMRs to HMIS without the need for double data entry by facility staff in both systems.

375 X.4.2.3.1 Routine reporting from EMR: Use Case Description

380 In the majority of countries, routine health facility reports are compiled manually at the facility from paper registers and tally sheets. To deal with the challenge of continuity of care, the antiretroviral therapy (ART) treatment center of a health facility has acquired an EMR system to manage patients. The routine ART reports demanded of the facility are complex, so there are considerable benefits in terms of reducing reporting burden as well as increasing accuracy to extracting reports from the EMR.

Current state

385 In the current state, aggregate data from a facility EMR is generated as a printed report and sent to a district office. Here, this aggregate data is hand-entered into the district health information system (DHIS), which feeds the national HMIS. This workflow is illustrated by Figure X.4.2.3.1-1.

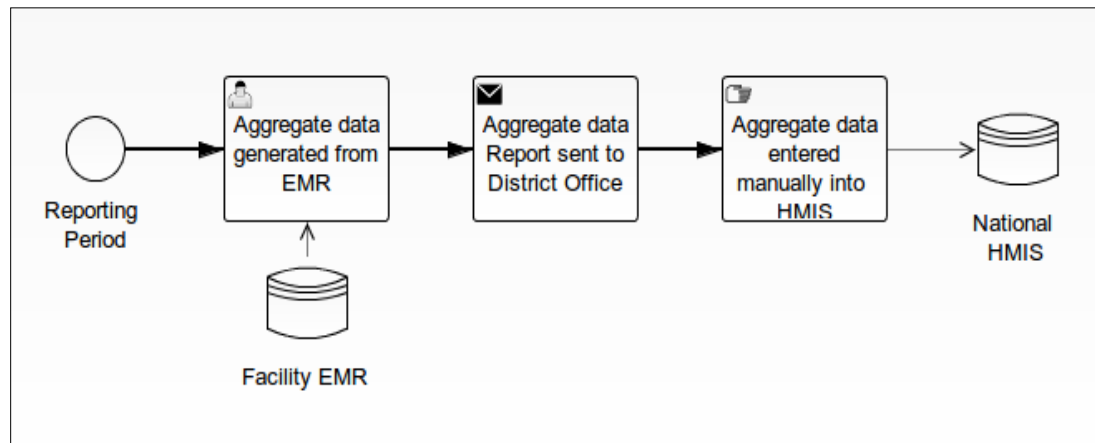


Figure X.4.2.3.1-1: Current state of EMR to HMIS data exchange

390 Desired state

The desired state is illustrated by Figure X.4.2.3.1-2. In the desired state, data from the facility EMR is used to generate an ADX-conformant message. The ADX-conformant message is sent by the facility EMR (acting as a Content Creator) to the DHIS (acting as a Content Consumer). Such a message exchange improves the timeliness and efficiency of the HMIS data reporting workflow.

395

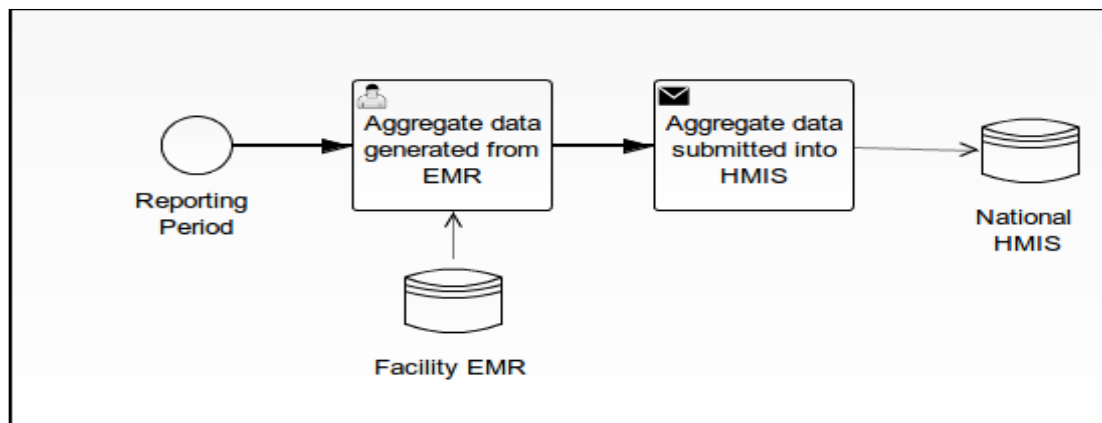


Figure X.4.2.3.1-2: Desired state of EMR to HMIS data exchange

400 The ADX Content Data Structure Creator models the facility monthly reports off the paper reporting form and consists of a set of data elements which form a logical set but are disaggregated differently. For example the number of ART stage 1 new enrollment is disaggregated by three age groups and by gender, whereas the number of patients on particular first line regimens is collected as simple counts without further disaggregation. The ART

405 monthly summary report from the facility will then consist of data which is not neatly
rectangular in terms of dimensions, but will instead be an example of the “ragged-right” ADX
message shape.

X.4.2.4 Use Case #4: Reporting data from HMIS to Other Aggregate Data Repositories

410 This use case describes ADX enabling the reporting of aggregate data from a national HMIS and
consumed by other aggregate data repositories used for global reporting.

X.4.2.4.1 Reporting national data from HMIS: Use Case Description

To facilitate Indicator reporting, country offices may generate aggregate data from national
HMIS for submission to funding agencies. In this case the national HMIS is the ADX Content
415 Data Structure Creator and Content Creator. This data can be consumed by other aggregate data
repositories, such as UNAIDS Global AIDS Response Progress Reporting (GARPR) online tool
and PEPFAR information system, Data for Accountability, Transparency and Impact (DATIM),
for monitoring health goals. As in the previous use case, the reported data will have a ragged
disaggregation dimensionality.

420

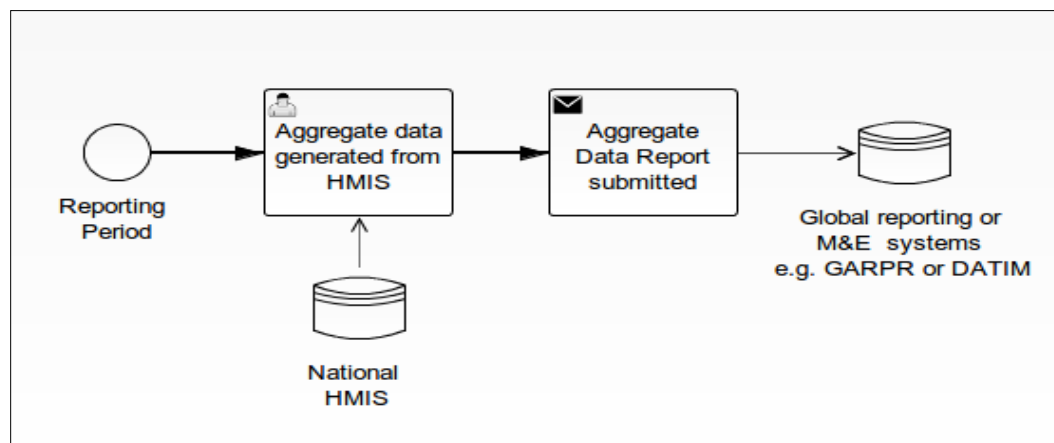


Figure X.4.2.4.1-1 – Global reporting to M&E Systems (e.g., DATIM)

X.5 ADX Security Considerations

425 The ADX Profile does not support the exchange of person-centric health information. Therefore,
this profile does not specify security mechanisms, such as the ITI Audit Trail and Node
Authentication (ATNA) Profile, that would be required were that the case. Implementers should
nevertheless be sensitive to the possibility of approximate personal identification arising from
aggregate data derived from small population sets. Transport of such data should be safeguarded
430 according to jurisdictional guidelines.

X.6 ADX Cross Profile Considerations

There are no Cross Profile considerations.

Appendices

None

435

Volume 2 – Transactions

Not applicable

Appendices

None

440

Volume 2 Namespace Additions

Add the following terms to the IHE General Introduction Appendix G:

NA

445

Volume 3 – Content Modules

5 Namespaces and Vocabularies

450 The following are namespaces referred to in this profile together with the prefix which is used to refer to that namespace within this document.

Namespace	Prefix	Description
http://www.sdmx.org/resources/sdmxml/schemas/v2_1/message	mes	SDMX 2.1 message
http://www.sdmx.org/resources/sdmxml/schemas/v2_1/structure	str	SDMX 2.1 structure definitions
http://www.sdmx.org/resources/sdmxml/schemas/v2_1/common	com	SDMX 2.1 common elements
http://www.w3.org/2001/XMLSchema	xs	W3C Schema
urn:ihe:qrph:adx:2015		ADX data payload

6 Content Modules

CDA® Content Modules - Not applicable

455 **7 Content Modules**

DICOM Content Modules -Not applicable

8 ADX Content Modules

This section defines Content Modules for the Aggregate Data Exchange (ADX) Profile.

460 8.1 Overview of ADX process

A Content Data Structure Creator creates ADX-conformant DSD and XSD files. Typically, the ADX Content Data Structure Creator will be an implementing jurisdiction such as a ministry of health, a global non-government organization (NGO) or a donor.

- 465 • An ADX compliant DSD is a profile of the SDMX 2.1 DSD, as described in Section 8.2 and formally expressed as a Schematron rule set in Appendix 8A.
- 470 • An ADX compliant schema is one that can be derived from an ADX compliant Data Structure Definition (DSD), as described in Section 8.3. The generation of an ADX schema from an ADX DSD makes use of a normative XSLT stylesheet provided in Appendix 8B. A sample ADX compliant schema is provided in the informative Appendix 8F.

Content Creators and Content Consumers use the DSD and XDS and exchange a data payload that conforms to an ADX compliant W3C XML schema. A sample ADX compliant data payload is provided in the informative Appendix 8G.

475 Additional (informative) message constraints for interoperability of ADX data exchange which are outside of the scope of this profile are described in Section 8.4.

8.2 The Data Structure Definition (DSD)

An ADX compliant DSD shall be all of:

- i. a well-formed XML 1.0 document;
- ii. a valid SDMX 2.1 `mes:Structure` message;
- 480 iii. compliant with the additional constraints defined below.

The purpose of profiling the base DSD is to provide guidance regarding which parts of an ADX DSD are fixed by the profile and which parts may be extended to support implementation-specific requirements.

8.2.1 ADX DSD constraints

485 A Schematron (ISO/IEC 19757-3:2006) schema is provided in Appendix 8A which provides a formal means of validating ADX DSD documents. This Section 8.2.1 provides a description of the constraints within the Schematron schema. In the event of disagreement or ambiguity between the textual and the schema, the Schematron shall be considered normative.

8.2.1.1 Top level structure

490 The root element of an ADX DSD document shall be a `mes:Structure` element.

The root element shall have a single `mes:Structures` child element.

The `mes:Structures` element shall have the following three child elements:

Element	Description
<code>str:Codelists</code>	Defines sets of data values that are allowed when a data dimension or attribute is constrained to an element within a set.
<code>str:Concepts</code>	Used to produce the dimension attribute names in an ADX data message.
<code>str>DataStructures</code>	Specifies the dimensions and attributes of the data including their syntax, tying them to Codelists and Concepts.

495 Note: ADX does not preclude the Content Data Structure Creator from including other SDMX elements in the structure message. Elements that are not prescribed in this specification may be ignored by the XSLT transform when generating an ADX schema.

500 Central to the governance of SDMX structure definitions is the notion of Agency. Each structure element (e.g., Codelist, ConceptScheme, DataStructure) has a maintenance agency identifier associated with it. ADX defines one agency identifier, 'IHE_ORPH', which is the maintenance agency for the mandatory concept scheme listed in Appendix 8D. A Content Data Structure Creator which is defining an ADX conformant DSD shall make use of an agency identifier which indicates that it is the maintenance authority for those structures which extend the mandatory ADX-defined structures.

505 The illustrative sample DSD in appendix 8E assumes a hypothetical use case where the West African Health Organisation uses the identifier 'WAHO' to define a DSD.

8.2.1.2 Codelists

The `str:Codelists` element may have any number of `str:Codelist` child elements.

510 The ADX Profile does not specify the content of code lists; these are specified by the implementing jurisdiction and used by the Content Data Structure Creator. The code lists used for controlling vocabulary of dimensions shall be provided within the DSD in SDMX v2.1 compatible format. The following example, Figure 8.2.1.2-1, shows a hypothetical code list for the West Africa Health Organisation to represent data elements:

515

```

<str:Codelists>
  <str:Codelist id="CL_DataElements" agencyID="WAHO" version="1.0">
    <com:Name xml:lang="en">West Africa Health Organisation Data elements</com:Name>
    <str:Code id="MAL01">
      <str:Name xml:lang="en">Confirmed Malaria cases</str:Name>
    </str:Code>
  </str:Codelist>
</str:Codelists>

```

520

```
525 <str:Code id="MAL02">
    <str:Name xml:lang="en">Unconfirmed Malaria cases</str:Name>
  </str:Code>
  <str:Code id="MAL03">
    <str:Name xml:lang="en">Malaria deaths</str:Name>
  </str:Code>
</str:Codelist>
  ...
</str:Codelists>
```

530 **Figure 8.2.1.2-1: DSD Codelist example**

The full example in Appendix 8C shows additional Codelists for orgUnits, Age Group and Sex representation.

8.2.1.3 Concepts

535 The `str:Concepts` element shall have one or more `str:ConceptScheme` child elements.

One of these `str:ConceptScheme` elements shall have an `@id` attribute of `ADX_MANDATORY_CONCEPTS` and `@agencyID` attribute of `IHE_QRPH`.

540 The mandatory `str:ConceptScheme` is shown in Figure 8.2.1.3-1. A Content Data Structure Creator shall not make any changes to the content of the mandatory `str:ConceptScheme` elements.

```
545 <str:ConceptSchemeid="ADX_MANDATORY_CONCEPTS" agencyID="IHE_QRPH"version="1.0"
    isFinal="true">
  <com:Name xml:lang="en">Mandatory concepts defined by IHE ADX profile</com:Name>
  <str:Concept id="dataElement" >
    <com:Name xml:lang="en">Subject of data measure</com:Name>
  </str:Concept>
  <str:Concept id="orgUnit" >
    <com:Name xml:lang="en">Spatial dimension of measure</com:Name>
  </str:Concept>
  <str:Concept id="period" >
    <com:Name xml:lang="en">The temporal dimension of the measure</com:Name>
  </str:Concept>
  <str:Concept id="value" >
    <com:Name xml:lang="en">Observed measure value</com:Name>
    <str:CoreRepresentation>
      <str:TextFormat textType="Decimal" />
    </str:CoreRepresentation>
  </str:Concept>
555 </str:ConceptScheme>
```

560 **Figure 8.2.1.3-1: DSD mandatory ConceptScheme**

565 Note that the value concept is the only concept which provides a core representation in the mandatory concept scheme. The enumerated code list representation for orgUnit and dataElement shall be provided as a str:LocalRepresentation of the str:Dimension as described below.

A Content Data Structure Creator may provide this concept scheme inline in the DSD content, though it is recommended that it refer to it with an external reference such as in Figure 8.2.1.3-2:

```
570 <str:ConceptScheme id="ADX_MANDATORY_CONCEPTS" agencyID="IHE_QRPH" version="1.0"
      isExternalReference="true" structureURL="qrph_structures.xml">
      <com:Name xml:lang="en">Mandatory concepts defined by IHE ADX profile</com:Name>
    </str:ConceptScheme>
```

Figure 8.2.1.3-2: External reference to ConceptScheme

575

Content Data Structure Creators may provide additional str:ConceptScheme elements to meet requirements of additional disaggregation. Figure 8.2.1.3-3 shows an example of one concept within an implementation-defined concept scheme:

```
580 <str:ConceptScheme id="ADX_WAHO_CONCEPTS" agencyID="WAHO" version="1.0">
    <com:Name xml:lang="en">Disaggregation concepts used in West Africa Health
      Organisation data warehouse</com:Name>
    <str:Concept id="AGE_GROUP" >
    <com:Name xml:lang="en">Age group</com:Name>
585 <str:CoreRepresentation>
    <str:Enumeration>
    <Ref agencyID="WAHO" id="CL_AgeGroup" version="1.0"/>
    </str:Enumeration>
    </str:CoreRepresentation>
590 </str:Concept>
    ...
  </str:ConceptScheme>
```

Figure 8.2.1.3-3: DSD Implementation ConceptScheme example

595 Note that concept schemes other than the mandatory concept scheme may, and should where possible, provide a str:CoreRepresentation which refers to a str:Codelist within the DSD. Where this is not possible (for example if the Content Data Structure Creator is not the maintenance Agency for the str:ConceptScheme), then the representation shall be provided as a str:LocalRepresentation of the str:Dimension as described in Section 8.2.1.4.1.

600 **8.2.1.4 DataStructures**

The str:DataStructures element defines the format of the data dimensions and ties them to concepts and codelists. SDMX v2.1 DSD allows the str:DataStructures element to have

any number of child `str:DataStructure` elements, however the ADX Profile specifies that there will be exactly one.

605

```
<str:DataStructures>
<str:DataStructure id="MALARIA" agencyID="WAHO" version="1.0">
  <com:Name xml:lang="en">ADX data structure</com:Name>
  <str:DataStructureComponents>
    <str:DimensionList> ... </str:DimensionList>
    <str:Group id="OUTER_DIMENSIONS"> ... </str:Group>
    <str:MeasureList> ... </str:MeasureList>
  </str:DataStructureComponents>
</str:DataStructure>
</str:DataStructures>
```

610

615

Figure 8.2.1.4-1: DataStructure example

SDMX allows for the definition of `str:Attributes` in addition to `str:Dimensions`. The xslt transformation which creates a data payload schema ignores any such `str:Attribute` definitions.

620

8.2.1.4.1 Dimensions

The `str:DataStructure` element shall have exactly one `str:DimensionList` child element. The `str:DimensionList` element shall have all of the following child elements:

- a `str:Dimension` with a `str:ConceptIdentity/Ref` child which refers to the concept in the mandatory concept scheme with `@id='dataElement'`.
- a `str:Dimension` with a `str:ConceptIdentity/Ref` child which refers to the concept in the mandatory concept scheme with `@id='orgUnit'`.
- a `str:TimeDimension` with a `str:ConceptIdentity/Ref` child which refers to the concept in the mandatory concept scheme with `@id='period'`.

625

630

The `str:DimensionList` may contain additional `str:Dimension` elements which refer to concepts which are provided by one or more `str:ConceptSchemes` outside of the ADX mandatory `ConceptScheme`. These may be used by a Content Data Structure Creator to provide additional optional disaggregation dimensions in addition to `dataElement`, `orgUnit` and `period`. The `dataElement` dimension in the sample is shown in the Figure 8.2.1.4.1-1

635

below:

```
<str:Dimension id="dataElement">
<str:ConceptIdentity>
<Ref id="dataElement" maintainableParentID="ADX_MANDATORY_CONCEPTS"
      maintainableParentVersion="1.0" agencyID="IHE_QRPH"/>
</str:ConceptIdentity>
```

640

645

```
<str:LocalRepresentation>
<str:Enumeration>
<Ref agencyID="WAHO" id="CL_DataElements" version="1.0"/>
</str:Enumeration>
</str:LocalRepresentation>
</str:Dimension>
```

Figure 8.2.1.4.1-1: The dataElement str:Dimension element

650 Note that, because the dataElement dimension is linked to a mandatory concept which has no str:CoreRepresentation, the Content Data Structure Creator shall provide a str:LocalRepresentation which constrains the vocabulary to that provided by a str:Codelist in the DSD.

An additional disaggregation dimension is shown in Figure 8.2.1.4.1-2 below:

655

660

```
<str:Dimension>
<str:ConceptIdentity>
<Ref id="ageGroup" maintainableParentID="ADX_WAHO_CONCEPTS"
maintainableParentVersion="1.0" agencyID="WAHO"/>
</str:ConceptIdentity>
</str:Dimension>
```

Figure 8.2.1.4.1-2: An optional disaggregation str:Dimension element

665 Note that this str:Dimension refers to a str:Concept which has a str:CoreRepresentation so there is no requirement to provide a str:LocalRepresentation.

A dimension shall have an @id attribute if:

- i. it is one of the mandatory dimensions, in which case it should have an @id attribute of 'dataElement', 'orgUnit' or 'TIME_PERIOD' respectively;
- 670 ii. the dimension is intended to be attached to the outer group as described below.

8.2.1.4.2 The TimeDimension

675 The str:TimeDimension shall have a str:LocalRepresentation child element which encloses a str:TextFormat element. The str:TextFormat shall have a @textType attribute with a value of either 'DateTime' or 'TimeRange', depending on whether the DSD is to be used for event based or routinely reported data. The choice of value for this attribute determines the xml data type for the period attribute which will be used in an ADX data payload.

TextType	Data type of period
dateTime	xs:dateTime
TimeRange	com:TimeRange

680

The SDMX `com:TimeRange` is defined in the SDMX common namespace and is modelled after `(xs:dateTime OR xs:date)/xs:duration`. An informative description of the use of this data type is provided in Appendix 8F.

8.2.1.4.3 Dimension grouping

685 SDMX 2.1 allows dimensions to be grouped so that each dimension does not have to be repeated for each measure value in the payload. ADX mandates that the `orgUnit` and `period` dimensions shall be attached at the group level and that the `dataElement` dimension shall be attached at the data value level. Optional disaggregation dimensions can be attached at either the group or data value level. The informative sample ADX data payload in Appendix 8E illustrates the
690 implication of this grouping.

- `Astr:Group` child element with an ID of `TIME_PERIOD` that refers as shown in the example below to the Concept elements with ID `period`.
- Under `str:TimeDimension` will be a `str:localRepresentation` element, and under this will be a `str:TextFormat` element with attribute `textType` having the
695 value `"ObservationalTimePeriod"`. SDMX v2.1 DSD allows many different `ObservationalTimePeriod` formats in data messages, but the ADX Profile further constrains these to the time periods as described in Appendix 8H.
- The `str:DataStructure` element shall have exactly one `str:Group` child element with ID `OUTER_DIMENSIONS`, as shown in the following example (this specifies which
700 data attributes must be present in a `group` element within a data payload conforming to this DSD).

Figure 8.2.1.4.3-1 below shows an example of the `str:Group` element showing the mandatory `orgUnit` and `period` dimensions as well as an additional disaggregation dimension with `@id='mechanism'`.

705

```

<str:Group id="OUTER_DIMENSIONS">
  <str:GroupDimension>
    <str:DimensionReference>
      <Ref id="orgUnit"/>
    </str:DimensionReference>
  </str:GroupDimension>
  <str:GroupDimension>
    <str:DimensionReference>

```

710

715

```
<Ref id="TIME_PERIOD"/>
</str:DimensionReference>
</str:GroupDimension>
<str:GroupDimension>
<str:DimensionReference>
720 <Ref id="mechanism"/>
</str:DimensionReference>
</str:GroupDimension>
</str:Group>
```

720

Figure 8.2.1.4.3-1: Example of str:Group element

725

8.2.1.4.4 The measure dimension

ADX requires that there be a primary measure which is linked to the mandatory value concept as shown in Figure 8.2.1.4.4-1 below.

730

```
<str:MeasureList>
<str:PrimaryMeasure>
<str:ConceptIdentity>
  <Ref id="value" maintainableParentID="ADX_MANDATORY_CONCEPTS"
  maintainableParentVersion="1.0" agencyID="IHE"/>
</str:ConceptIdentity>
735 </str:PrimaryMeasure>
</str:MeasureList>
```

735

Figure 8.2.1.4.4-1: Example of str:Group element

740

The Representation for the value concept is provided as a CoreRepresentation in the ConceptScheme. Implementers may not override this with a LocalRepresentation.

8.3 Generating the schema for an ADX data payload

ADX data within a particular jurisdiction shall be constrained by a schema which is generated from the ADX DSD. That schema shall be generated by applying the XSLT transformation given in Appendix 8B to the ADX compliant DSD file.

745

This transformation assumes that all structure elements appear inline in the DSD XML document. Where external references are used, the DSD may be pre-processed, for example using the transformation provided in Appendix 8C.

8.4 ADX Message Exchange Constraints (Informative)

750

There are implicit assumptions regarding the sharing of additional metadata between Content Creators and Content Consumers which are not covered within the scope of the ADX Profile. In

order to ensure semantic validity of the exchanged data, the constraints described below shall be specified using processes not defined by this profile:

- 755
- The dataElements to be reported for particular orgUnits. For example, reporting ‘Number of lab Tests performed’ from a health facility which did not perform laboratory tests is not constrained by ADX.
 - The disaggregation dimensions which are expected for particular dataElements.
 - The Value type (real or integer) expected for individual dataElements.
 - Which period types are appropriate for which dataElements.

760 The preceding is not an exhaustive list. Other business rules that may affect interoperability may need to be established such as bounds on data values, bounds on date ranges, relationships between different dataElements (e.g., the sum of these dataElements cannot be greater than the sum of those dataElements, etc.).

Appendices to Section 8

Appendix 8A – (Normative) Schematron constraining ADX/DSD

765 Current working copy available at https://github.com/dhis2/adx/blob/master/IHE/schema/dsd_validation.sch

```
770 <?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://purl.oclc.org/dsdl/schematron"
queryBinding="xslt"
  xmlns:h="http://www.w3.org/1999/xhtml">

<title>Validation of ADX Data Structure Definition</title>

775 <p>An ADX profiled Data Structure Definition (DSD) is
      (i) a well formed XML document and
      (ii) a valid SDMX 2.1 Structure message and
      (iii) is further subject to additional constraints expressed in
this schematron schema.
</p>

780 <p>The following are namespaces defined in SDMX 2.1 which are used in
an ADX profiled DSD</p>
<ns prefix="mes" uri="http://www.sdmx.org/resources/sdmxml/schemas/v2_1/message" />
785 <ns prefix="str" uri="http://www.sdmx.org/resources/sdmxml/schemas/v2_1/structure" />
<ns prefix="com" uri="http://www.sdmx.org/resources/sdmxml/schemas/v2_1/common" />

<pattern>
<title>Testing that Structures are all present</title>
790 <rule context="mes:Structure">
<assert test="count(mes:Structures)=1">
      There shall be a single mes:Structures element in the message.
</assert>
</rule>

795 <rule context="mes:Structures" >
<assert test="count(str:Codelists)=1">
      There shall be a single Codelists element.
</assert>

800 <assert test="count(str:Concepts)=1">
      There shall be a single Concepts element.
```

```

805 </assert>
<assert test="count(str:DataStructures/str:DataStructure)=1">
    There shall be a single DataStructure element.
</assert>

810 <let name="ADX_Concepts" value="str:Concepts/str:ConceptScheme[
    @id='ADX_MANDATORY_CONCEPTS' and @agencyID='IHE_QRPH']"/>

<assert
815 test="count($ADX_Concepts)=1">
    There shall be a ConceptScheme with @id='ADX_MANDATORY_CONCEPTS' and
    @agencyID='IHE_QRPH' .
</assert>

</rule>

820 </pattern>

<pattern>
<title>Testing DataStructureComponents</title>

825 <let name="components" value="str:DataStructureComponents" />
<let name="dimensions" value="$components/str:DimensionList"/>

<rule context="str:DataStructure/str:DataStructureComponents">

830 <assert test="count(str:Group[@id='OUTER_DIMENSIONS'])=1">
    There shall be a Group with @id='OUTER_DIMENSIONS'
</assert>

</rule>

835 <p>The dimension list shall include the mandatory dimensions</p>
<rule context="str:DimensionList">
<let name="dataElementDimension" value="str:Dimension[@id='dataElement']" />
<let name="orgUnitDimension" value="str:Dimension[@id='orgUnit']" />
840 <let name="periodDimension" value="str:TimeDimension[@id='TIME_PERIOD']" />

<assert test="count($dataElementDimension)=1">
    There shall be a dimension with @id='dataElement'.
</assert>

845 <assert test="count($orgUnitDimension)=1">
    There shall be a dimension with @id='orgUnit'.
</assert>
    
```

```

850 <assert test="count($periodDimension)=1">
      There shall be a TimeDimension with @id='TIME_PERIOD'.
</assert>
</rule>
855 <p>
      The dataElement dimension must be linked to the mandatory 'dataElement' concept and
      provide a LocalRepresentation.
</p>
860 <rule context="str:Dimension[@id='dataElement']">
<assert
test="str:ConceptIdentity/Ref/@id='dataElement'">
      @id of dataElement concept reference must be 'dataElement'.
</assert>
865 <assert
test="str:ConceptIdentity/Ref/@maintainableParentID='ADX_MANDATORY_CONCEPTS'">
      @maintainableParentID of dataElement dimension concept reference
870 must be 'ADX_MANDATORY_CONCEPTS'.
</assert>
<assert test="count(str:LocalRepresentation)=1">
dataElement dimension must provide LocalRepresentation.
</assert>
875 </rule>
<p>
880 The orgUnit dimension must be linked to the mandatory 'orgUnit' concept and
      provide a LocalRepresentation.
</p>
<rule context="str:Dimension[@id='orgUnit']">
885 <assert
test="str:ConceptIdentity/Ref/@id='orgUnit'">
      @id of orgUnit concept reference must be 'orgUnit'.
</assert>
890 <assert
test="str:ConceptIdentity/Ref/@maintainableParentID='ADX_MANDATORY_CONCEPTS'">
      @maintainableParentID of orgUnit dimensions concept reference
      must be 'ADX_MANDATORY_CONCEPTS'.
</assert>
895 <assert test="count(str:LocalRepresentation)=1">

```

```

900 orgUnit dimension must provide LocalRepresentation.
    </assert>
    </rule>
    <p>
          The TimeDimension must be linked to the mandatory 'period' concept and
    provide a LocalRepresentation.
    </p>
905 <rule context="str:TimeDimension">
    <assert
    test="str:ConceptIdentity/Ref/@id='period'">
          @id of orgUnit concept reference must be 'period'.
    </assert>
910 <assert
    test="str:ConceptIdentity/Ref/@maintainableParentID='ADX_MANDATORY_CONCEPTS'">
          @maintainableParentID of period dimension concept reference
    must be 'ADX_MANDATORY_CONCEPTS'.
    </assert>
915 <let name="periodFormat" value="str:LocalRepresentation/str:TextFormat/@textType"/>
    <assert test="$periodFormat='TimeRange' or $periodFormat='DateTime'">
          The time period format must be either 'TimeRange' or 'DateTime'.
    </assert>
920 </rule>
    <p>
          The orgUnit and period dimensions must be attached to the outer group. The dataElement
    dimension may not be in the outer group.
    </p>
925 <rule context="str:Group[@id='OUTER_DIMENSIONS']">
    <assert test="count(str:GroupDimension/str:DimensionReference/Ref[@id='orgUnit'])=1" >
          The orgUnit dimension must appear once in the 'OUTER_DIMENSIONS' group.
    </assert>
930 <assert test="count(str:GroupDimension/str:DimensionReference/Ref[@id='TIME_PERIOD'])=1" >
          The period dimension must appear once in the 'OUTER_DIMENSIONS' group.
    </assert>
935 <assert test="count(str:GroupDimension/str:DimensionReference/Ref[@id='dataElement'])=0" >
          The period dimension must appear once in the 'OUTER_DIMENSIONS' group.
    </assert>
940 </rule>

```

```
945 </rule>
945 <p>
945     The PrimaryMeasure must be linked to the mandatory 'value' concept.
945 </p>
945 <rule context="str:PrimaryMeasure">
950 <assert
950 test="str:ConceptIdentity/Ref/@id='value'">
950     @id of PrimaryMeasure concept reference must be 'value'.
950 </assert>
955 <assert
955 test="str:ConceptIdentity/Ref/@maintainableParentID='ADX_MANDATORY_CONCEPTS'">
955     @maintainableParentID of PrimaryMeasure concept reference
955     must be 'ADX_MANDATORY_CONCEPTS'.
955 </assert>
960 </rule>
960 </pattern>
960 </schema>
```

965 **Appendix 8B – (Normative) XSLT to generate ADX/XSD schema from DSD**

Current working copy available at <https://github.com/dhis2/adx/blob/master/IHE/xslt/dsd2adx2.xsl>

```
970 <?xml version="1.0" encoding="UTF-8"?>
970 <xsl:stylesheet xmlns:xsl="http://www.w3.org/1999/XSL/Transform"
970     xmlns:xs="http://www.w3.org/2001/XMLSchema"
970     xmlns:str="http://www.sdmx.org/resources/sdmxml/schemas/v2_1/structure"
970     exclude-result-prefixes="xs" version="1.0">
975 <xsl:output encoding="UTF-8" xml:space="preserve" method="xml" indent="yes"/>
975 <!--
975     This stylesheet is a normative part of the ADX profile (urn:ihe:qrph:adx:2015)
975
975     When applied to an ADX conformant SDMX Data Structure Definition it emits
980 a W3C XML Schema document suitable for validation of ADX data payloads.
980 -->
980 <!-- =====
980     Variable declarations
```



```

985      ===== -->
<!-- Dimension nodes -->
<xsl:variable name="dimensions" select="//str:Dimension"/>

990 <!-- Jurisdiction specific Dimensions at group level -->
<xsl:variable name="outerDimensions"
      select="$dimensions[//str:Group[@id='OUTER_DIMENSIONS']/descendant::Ref/@id = @id
and @id != 'orgUnit']"/>

995 <!-- Jurisdiction specific Dimensions at dataValue level -->
<xsl:variable name="innerDimensions"
      select="$dimensions[not (//str:Group[@id='OUTER_DIMENSIONS']/descendant::Ref/@id = @id )
and str:ConceptIdentity/Ref/@id != 'dataElement']"/>

1000 <!-- Mandatory dimensions -->
<xsl:variable name="orgUnitDimension" select="$dimensions[@id='orgUnit']" />
<xsl:variable name="dataElementDimension" select="$dimensions[@id='dataElement']" />

<!-- Reference to the orgUnit code list -->
1005 <xsl:variable
      name="orgUnitCLRef"
      select="$orgUnitDimension/str:LocalRepresentation/str:Enumeration/Ref" />

<!-- Construction of the orgUnit type name -->
1010 <xsl:variable name="orgUnitType"
      select="concat($orgUnitCLRef/@id, '_', $orgUnitCLRef/@agencyID, '_',
      $orgUnitCLRef/@version, '_Type')" />

<!-- Reference to the dataElement code list -->
1015 <xsl:variable
      name="dataElementCLRef"
      select="$dataElementDimension/str:LocalRepresentation/str:Enumeration/Ref" />

<!-- Construction of the dataElement type name -->
1020 <xsl:variable name="dataElementType"
      select="concat($dataElementCLRef/@id, '_',
      $dataElementCLRef/@agencyID, '_', $dataElementCLRef/@version, '_Type')" />

<!-- ===== -->
1025      Root Template Match
      ===== -->

<xsl:template match="/">

1030 <xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
      xmlns="urn:ihe:qrph:adx:2015"
      xmlns:common="http://www.sdmx.org/resources/sdmxml/schemas/v2_1/common"

```

```

targetNamespace="urn:ihe:qrph:adx:2015" elementFormDefault="qualified">
1035 <!-- Copyright notice -->
<xs:annotation>
<xs:documentation> This is an example of a tightly constrained schema which should
1040 validate an adx data document which has been formed in compliance with the
sample SDMX DSD. </xs:documentation>
</xs:annotation>

<xs:import namespace="http://www.sdmx.org/resources/sdmxml/schemas/v2_1/common"
1045 schemaLocation="sdmx/SDMXCommon.xsd" />

<!-- generate enumerated types for dimensions -->
<xsl:apply-templates select="//str:Codelist"/>

1050 <!-- generate dateTime type -->
<xsl:apply-templates select="//str:TimeDimension" />

<!-- generate complex types -->
<xsl:call-template name="adx" />
1055 <xsl:call-template name="group" />
<xsl:call-template name="dataValue" />

<xs:element name="adx" type="adxType"/>

</xs:schema>
1060 </xsl:template>

<!-- =====
Complex Element types
1065 1. ADX Root element type
===== -->
<xsl:template name="adx">
<xs:complexType name="adxType">
<xs:sequence maxOccurs="unbounded">
1070 <xs:element name="group" type="groupType"/>
</xs:sequence>
<xs:attribute name="exported" use="required" type="xs:dateTime"/>
<xs:anyAttribute processContents="skip"/>
</xs:complexType>
1075 </xsl:template>

<!-- =====
2. groupType
===== -->

```

```

1080 <xsl:template name="group">
<xs:complexType name="groupType">
<xs:sequence maxOccurs="unbounded">
<xs:element name="dataValue" type="DataValueType"/>
</xs:sequence>
1085 <xs:attribute name="orgUnit" use="required" type="{ $orgUnitType }"/>
<xs:attribute name="period" use="required" type="periodType"/>

<xsl:apply-templates select="$outerDimensions" />

1090 <xs:anyAttribute processContents="skip"/>
</xs:complexType>
</xsl:template>

<!-- =====
1095 3. dataValueType
===== -->
<xsl:template name="dataValue">
<xs:complexType name="DataValueType">
<xs:sequence maxOccurs="1" minOccurs="0">
1100 <xs:element name="annotation" />
</xs:sequence>

<xs:attribute name="dataElement" use="required" type="{ $dataElementType }"/>
<xs:attribute name="value" use="required" type="xs:decimal"/>

1105 <xsl:apply-templates select="$innerDimensions" />

<xs:anyAttribute processContents="skip"/>

1110 </xs:complexType>
</xsl:template>

<!-- =====
1115 Type restrictions derived from SDMX DSD Codelists
===== -->
<xsl:template match="str:Codelist">
<xsl:variable name="type" select="concat(@id,'_',@agencyID,'_',@version,'_Type')"/>
<xs:simpleType name="{ $type }">
<xs:restriction base="xs:token">
1120 <xsl:for-each select="str:Code">
<xs:enumeration value="{ @id }"/>
</xsl:for-each>
</xs:restriction>
</xs:simpleType>
1125 </xsl:template>

```

```

1130 <!-- =====
      Time dimension type
      ===== -->
1135 <xsl:template match="str:TimeDimension">
1140 <xsl:variable name="timeFormat" select="str:LocalRepresentation/str:TextFormat"/>
1145 <xsl:simpleType name="periodType">
1150 <xsl:choose>
1155 <xsl:when test="$timeFormat/@textType='DateTime'">
1160 <xsl:restriction base="xs:dateTime"/>
1165 </xsl:when>
1170 <xsl:when test="$timeFormat/@textType='TimeRange'">
1175 <xsl:restriction base="common:TimeRangeType"/>
1180 </xsl:when>
1185 <xsl:otherwise>
1190 <xsl:message>
1195         Only SDMX DateTime and TimeRange are supported types
1200 </xsl:message>
1205 </xsl:otherwise>
1210 </xsl:choose>
1215 </xs:simpleType>
1220 </xsl:template>

1225 <!-- =====
      Produce attributes for dimension
      ===== -->
1230 <xsl:template match="str:Dimension">
1235 <xsl:variable name="conceptID" select="str:ConceptIdentity/Ref/@id"/>
1240 <xsl:variable name="conceptSchemeID" select="str:ConceptIdentity/Ref/@maintainableParentID"/>
1245 <xsl:choose>
1250 <!-- if there is a LocalRepresentation, use that -->
1255 <xsl:when test="str:LocalRepresentation">
1260 <xsl:variable name="codelist" select="str:LocalRepresentation/str:Enumeration/Ref"/>
1265 <xsl:variable name="type"
1270 select="concat($codelist/@id,'_', $codelist/@agencyID,'_', $codelist/@version,'_Type')"/>
1275 <xsl:attribute name="{ $conceptID }" type="{ $type }" use="optional"/>
1280 </xsl:when>
1285 <!-- otherwise lookup the CoreRepresentation for the Concept -->
1290 <xsl:otherwise>
1295 <xsl:variable name="concept"
1300 select="//str:ConceptScheme[
1305         @id=$conceptSchemeID]/str:Concept[@id=$conceptID]"/>
1310 <xsl:variable name="codelist"
1315 select="$concept/str:CoreRepresentation/str:Enumeration/Ref"/>
1320 <xsl:variable name="type"
1325 select="concat($codelist/@id,'_', $codelist/@agencyID,'_', $codelist/@version,'_Type')"/>
1330 <xsl:attribute name="{ $conceptID }" type="{ $type }" use="optional"/>

```

1175

```
</xsl:otherwise>
</xsl:choose>
</xsl:template>
</xsl:stylesheet>
```

Appendix 8C – (Informative) DSD pre-processor to resolve external references

Current working copy available at https://github.com/dhis2/adx/blob/master/IHE/xslt/dsd_preprocess.xsl

1180

```
<?xml version="1.0" encoding="UTF-8"?>
<xsl:stylesheet xmlns:xsl="http://www.w3.org/1999/XSL/Transform"
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns:mes="http://www.sdmx.org/resources/sdmxml/schemas/v2_1/message"
```

1185

```
  exclude-result-prefixes="xs"
  version="1.0">
```

1190

```
<!--
  Stylesheet to pre-process an SDMX 2.1 DSD to pull in external references
-->
<xsl:strip-space elements="*" />
<xsl:output method="xml" indent="yes" />
```

1195

```
<!-- The default action is to just copy each node to output - identity template -->
<xsl:template match="/" | @* | node()">
<xsl:copy>
<xsl:apply-templates select="@* | node()" />
</xsl:copy>
</xsl:template>
```

1200

```
<!-- Copy in external references where indicated -->
<xsl:template match="*[@isExternalReference = 'true' and @structureURL]">
<xsl:message>
  External reference for <xsl:value-of select="name()" /> fetched from <xsl:value-of select="@structureURL" />
```

1205

```
</xsl:message>
<xsl:variable name="elementName" select="name()" />
<xsl:variable name="id" select="@id" />
<xsl:variable name="agencyID" select="@agencyID" />
<xsl:variable name="version" select="@version" />
```

1210

```
<xsl:copy-of select="document(@structureURL)//*[name()=$elementName
  and @id=$id and @agencyID=$agencyID and @version=$version]" />
</xsl:template>
</xsl:stylesheet>
```

Appendix 8D – (Normative) ADX Mandatory ConceptScheme

1215 Current working copy available at https://github.com/dhis2/adx/blob/master/IHE/samples/qrph_structures.xml

```
1220 <?xml version="1.0" encoding="UTF-8"?>
    <mes:Structure xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
        xsi:schemaLocation="http://www.sdmx.org/resources/sdmxml/schemas/v2_1/message ../schema/sdmx/SDMXMessage.xsd"
        xmlns:com="http://www.sdmx.org/resources/sdmxml/schemas/v2_1/common"
        xmlns:str="http://www.sdmx.org/resources/sdmxml/schemas/v2_1/structure"
        xmlns:mes="http://www.sdmx.org/resources/sdmxml/schemas/v2_1/message">
    <mes:Header>
1225 <mes:ID>ADX_STRUCTURES</mes:ID>
    <mes:Test>>false</mes:Test>
    <mes:Prepared>2015-05-01T14:30:47.000Z</mes:Prepared>
    <mes:Sender id="IHE_QRPH">
1230 <com:Name xml:lang="en">QRPH Technical Committee</com:Name>
    </mes:Sender>
    </mes:Header>

    <mes:Structures>

1235 <str:OrganisationSchemes>
    <str:AgencyScheme id="AGENCIES" agencyID="IHE_QRPH">
    <com:Name>List of AGENCY identifiers maintained by IHE QRPH</com:Name>
    <str:Agency id="IHE_QRPH" >
    <com:Name>IHE Quality Research and Public Health Technical Committee</com:Name>
1240 </str:Agency>
    </str:AgencyScheme>
    </str:OrganisationSchemes>

    <str:Concepts>
1245 <!-- ADX Mandatory concepts -->
    <str:ConceptScheme id="ADX_MANDATORY_CONCEPTS" agencyID="IHE_QRPH" version="1.0">
    <com:Name xml:lang="en">Mandatory concepts defined by IHE ADX profile</com:Name>

    <!-- There is no default representation for these concepts. An Agency which makes
1250 use of these to construct an ADX DataStructure has to provide a local representation -->
    <str:Concept id="dataElement">
    <com:Name xml:lang="en">Subject of the data measure</com:Name>
    </str:Concept>
    <str:Concept id="orgUnit">
1255 <com:Name xml:lang="en">Spatial dimension of the measure</com:Name>
    </str:Concept>
    <str:Concept id="period">
    <com:Name xml:lang="en">Temporal dimension of the measure</com:Name>
```

```

1260 </str:Concept>
1260 <!-- The value concept is represented by an integer or real number (xsd:decimal)-->
1260 <str:Concept id="value">
1260 <com:Name xml:lang="en">Value of the data measure</com:Name>
1260 <str:CoreRepresentation>
1265 <str:TextFormat textType="Decimal"/>
1265 </str:CoreRepresentation>
1265 </str:Concept>
1265 </str:ConceptScheme>
1265 </str:Concepts>
1270 </mes:Structures>
1270 </mes:Structure>
    
```

Appendix 8E – (Informative) Sample ADX DSD

Current working copy available at https://github.com/dhis2/adx/blob/master/IHE/samples/adx_sample_dsd2.xml

```

1275 <?xml version="1.0" encoding="UTF-8"?>
1275 <?xml-model href=" ../schema/dsd_validation.sch" type="application/xml" schematypens="http://purl.oclc.org/dsdl/schematron"?>
1275 <mes:Structure xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
1275 xsi:schemaLocation="http://www.sdmx.org/resources/sdmxml/schemas/v2_1/message ../schema/sdmx/SDMXMessage.xsd"
1280 xmlns:com="http://www.sdmx.org/resources/sdmxml/schemas/v2_1/common"
1280 xmlns:str="http://www.sdmx.org/resources/sdmxml/schemas/v2_1/structure"
1280 xmlns:mes="http://www.sdmx.org/resources/sdmxml/schemas/v2_1/message">
1280 <mes:Header>
1280 <mes:ID>DSD_ADX</mes:ID>
1285 <mes:Test>true</mes:Test>
1285 <mes:Prepared>2015-01-13T14:30:47.000Z</mes:Prepared>
1285 <mes:Sender id="Bob">
1285 <com:Name xml:lang="en">Bob Jolliffe</com:Name>
1285 </mes:Sender>
1290 </mes:Header>
1290 <mes:Structures>
1290 <str:Codelists>
1295 <!-- These are used to constrain vocabulary of dimension values -->
1295 <str:Codelist id="CL_OrgUnits" agencyID="WAHO" version="1.0" >
1295 <com:Name xml:lang="en">Reporting health clinics</com:Name>
1295 <str:Code id="342">
1295 <com:Name xml:lang="en">Bob's clinic</com:Name>
    
```

1300

```
</str:Code>
<str:Code id="343">
<com:Name xml:lang="en">Jim's clinic</com:Name>
</str:Code>
</str:Codelist>
```

1305

```
<str:Codelist id="CL_DataElements" agencyID="WAHO" version="1.0">
<com:Name xml:lang="en">WAHO Data elements</com:Name>
<str:Code id="MAL01">
```

1310

```
<com:Name xml:lang="en">Confirmed Malaria cases</com:Name>
</str:Code>
<str:Code id="MAL02">
<com:Name xml:lang="en">Unconfirmed Malaria cases</com:Name>
</str:Code>
```

1315

```
<str:Code id="MAL03">
<com:Name xml:lang="en">Confirmed Malaria deaths</com:Name>
</str:Code>
<str:Code id="MAL04">
<com:Name xml:lang="en">Unconfirmed Malaria deaths</com:Name>
</str:Code>
```

1320

```
</str:Codelist>
```

1325

```
<str:Codelist id="CL_AgeGroup" agencyID="WAHO" version="1.0">
<com:Name xml:lang="en">WAHO Age Groups</com:Name>
<str:Code id="under5">
<com:Name xml:lang="en">Under 5 years of age</com:Name>
</str:Code>
<str:Code id="5andOver">
<com:Name xml:lang="en">5 Years and over</com:Name>
</str:Code>
```

1330

```
</str:Codelist>
```

1335

```
<str:Codelist id="CL_Sex" agencyID="WAHO" version="1.0">
<com:Name xml:lang="en">WAHO Sex categories</com:Name>
<str:Code id="M">
<com:Name xml:lang="en">Male</com:Name>
</str:Code>
<str:Code id="F">
<com:Name xml:lang="en">Female</com:Name>
</str:Code>
```

1340

```
</str:Codelist>
```

1345

```
<str:Codelist id="CL_Mechanism" agencyID="WAHO" version="1.0">
<com:Name xml:lang="en">Funding mechanisms</com:Name>
<str:Code id="PEPFAR">
<com:Name xml:lang="en">PEPFAR</com:Name>
</str:Code>
```


1350

```
<str:Code id="GFATM">
<com:Name xml:lang="en">Global Fund</com:Name>
</str:Code>
<str:Code id="OTHER">
<com:Name xml:lang="en">Other</com:Name>
</str:Code>
</str:Codelist>
```

1355

```
</str:Codelists>
```

1360

```
<str:Concepts>
<!-- These are named concepts which are referred to in the definition of
data dimensions. They can be constrained through the use of codelists
or text format patterns using a CoreRepresentation
-->
```

1365

```
<str:ConceptScheme id="ADX_MANDATORY_CONCEPTS" agencyID="IHE_QRPH" version="1.0"
isExternalReference="true" structureURL="qrph_structures.xml" >
<com:Name xml:lang="en">Mandatory concepts defined by IHE ADX profile</com:Name>
</str:ConceptScheme>
```

1370

```
<str:ConceptScheme id="ADX_WAHO_CONCEPTS" agencyID="WAHO" version="1.0" >
<!-- These concepts are user-defined by an Agency other than IHE_QRPH.
A concept is declared together with its core representation reference
to a codelist
-->
```

1375

```
<com:Name xml:lang="en">Disaggregation concepts used in WAHO data warehouse</com:Name>
<str:Concept id="ageGroup">
<com:Name xml:lang="en">Age group</com:Name>
<str:CoreRepresentation>
<str:Enumeration>
<Ref agencyID="WAHO" id="CL_AgeGroup" version="1.0"/>
```

1380

```
</str:Enumeration>
</str:CoreRepresentation>
</str:Concept>
```

1385

```
<str:Concept id="sex">
<com:Name xml:lang="en">Sex</com:Name>
<str:CoreRepresentation>
<str:Enumeration>
<Ref agencyID="WAHO" id="CL_Sex" version="1.0"/>
```

1390

```
</str:Enumeration>
</str:CoreRepresentation>
</str:Concept>
<str:Concept id="mechanism">
<com:Name xml:lang="en">Funding Mechanism</com:Name>
<str:CoreRepresentation>
<str:Enumeration>
```

```

1395 <Ref agencyID="WAHO" id="CL_Mechanism" version="1.0"/>
      </str:Enumeration>
    </str:CoreRepresentation>
  </str:Concept>
</str:ConceptScheme>
1400 </str:Concepts>

    <str>DataStructures>
      <!-- An implementing Agency other than IHE_QRPH defines the DatStructure to
1405 use for ADX data payloads in that jurisdiction. The dataStructure must
      have Dimensions which correspond to the core concepts and provide a
      local representation which links those dimensions to codelists. -->

      <str>DataStructure id="MALARIA" agencyID="WAHO" version="1.0" >
        <com:Name xml:lang="en">Data structure for malaria routine report</com:Name>

1410 <str>DataStructureComponents>

      <str:DimensionList>

1415 <str:Dimension id="dataElement" >
        <str:ConceptIdentity>
          <Ref id="dataElement" maintainableParentID="ADX_MANDATORY_CONCEPTS"
1420 maintainableParentVersion="1.0" agencyID="IHE_QRPH"/>
        </str:ConceptIdentity>
        <str:LocalRepresentation>
          <str:Enumeration>
            <Ref agencyID="WAHO" id="CL_DataElements" version="1.0"/>
1425 </str:Enumeration>
          </str:LocalRepresentation>
        </str:Dimension>

        <str:Dimension id="orgUnit">
          <str:ConceptIdentity>
            <Ref id="orgUnit" maintainableParentID="ADX_MANDATORY_CONCEPTS"
1430 maintainableParentVersion="1.0" agencyID="IHE_QRPH"/>
          </str:ConceptIdentity>
          <str:LocalRepresentation>
            <str:Enumeration>
              <Ref agencyID="WAHO" id="CL_OrgUnits" version="1.0"/>
1435 </str:Enumeration>
            </str:LocalRepresentation>
          </str:Dimension>

        <str:Dimension>
          <str:ConceptIdentity>
1440 <Ref id="sex" maintainableParentID="ADX_WAHO_CONCEPTS"

```

```

maintainableParentVersion="1.0" agencyID="WAHO"/>
</str:ConceptIdentity>
</str:Dimension>
1445 <str:Dimension>
<str:ConceptIdentity>
<Ref id="ageGroup" maintainableParentID="ADX_WAHO_CONCEPTS"
maintainableParentVersion="1.0" agencyID="WAHO"/>
</str:ConceptIdentity>
1450 </str:Dimension>

<str:Dimension id="mechanism">
<str:ConceptIdentity>
<Ref id="mechanism" maintainableParentID="ADX_WAHO_CONCEPTS"
maintainableParentVersion="1.0" agencyID="WAHO"/>
</str:ConceptIdentity>
1455 </str:Dimension>

<str:TimeDimension id="TIME_PERIOD">
<str:ConceptIdentity>
<Ref id="period" maintainableParentID="ADX_MANDATORY_CONCEPTS"
maintainableParentVersion="1.0" agencyID="IHE_QRPH"/>
</str:ConceptIdentity>
1460 <str:LocalRepresentation>
<!-- An ADX DSD allows either an SDMX 'TimeRange' or 'DateTime'
representation of the time dimension -->
<str:TextFormat textType="TimeRange"/>
</str:LocalRepresentation>
1465 </str:TimeDimension>
</str:DimensionList>
1470

<!-- These dimensions are identified as being used as outer dimensions
of the data. They must include orgUnit and period. -->
1475 <str:Group id="OUTER_DIMENSIONS">
<str:GroupDimension>
<str:DimensionReference>
<Ref id="orgUnit"/>
</str:DimensionReference>
</str:GroupDimension>
1480 <str:GroupDimension>
<str:DimensionReference>
<Ref id="TIME_PERIOD"/>
</str:DimensionReference>
</str:GroupDimension>
1485 <str:GroupDimension>
<str:DimensionReference>
<Ref id="mechanism"/>

```

```

1490 </str:DimensionReference>
</str:GroupDimension>
</str:Group>

1495 <!-- ADX requires that there be a primary measure which is linked to
the value concept. -->
<str:MeasureList>
<str:PrimaryMeasure>
<str:ConceptIdentity>
1500 <Ref id="value" maintainableParentID="ADX_MANDATORY_CONCEPTS"
maintainableParentVersion="1.0" agencyID="IHE"/>
</str:ConceptIdentity>
</str:PrimaryMeasure>
</str:MeasureList>

</str:DataStructureComponents>

1505 </str:DataStructure>
</str>DataStructures>
</mes:Structures>

</mes:Structure>
    
```

1510 **Appendix 8F – (Informative) Generated sample ADX data schema**

Current working copy available at

https://github.com/dhis2/adx/blob/master/IHE/schema/adx_sample_generated.xsd

```

1515 <?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="urn:ihe:qrph:adx:2015" xmlns:common="http://www.sdmx.org/resources/sdmxml/schemas/v2_1/common"
xmlns:xs="http://www.w3.org/2001/XMLSchema" xmlns:str="http://www.sdmx.org/resources/sdmxml/schemas/v2_1/structure"
targetNamespace="urn:ihe:qrph:adx:2015" elementFormDefault="qualified">
<xs:annotation>
1520 <xs:documentation> This is an example of a tightly constrained schema which should
validate an adx data document which has been formed in compliance with the
sample SDMX DSD. </xs:documentation>
</xs:annotation>
<xs:import namespace="http://www.sdmx.org/resources/sdmxml/schemas/v2_1/common" schemaLocation="sdmx/SDMXCommon.xsd"/>
1525 <xs:simpleType name="CL_OrgUnits_WAHO_1.0_Type">
<xs:restriction base="xs:token">
<xs:enumeration value="342"/>
<xs:enumeration value="343"/>
</xs:restriction>
    
```

```

1530 </xs:simpleType>
1530 <xs:simpleType name="CL_DataElements_WAHO_1.0_Type">
1530 <xs:restriction base="xs:token">
1530 <xs:enumeration value="MAL01"/>
1530 <xs:enumeration value="MAL02"/>
1535 <xs:enumeration value="MAL03"/>
1535 <xs:enumeration value="MAL04"/>
1535 </xs:restriction>
1535 </xs:simpleType>
1540 <xs:simpleType name="CL_AgeGroup_WAHO_1.0_Type">
1540 <xs:restriction base="xs:token">
1540 <xs:enumeration value="under5"/>
1540 <xs:enumeration value="5andOver"/>
1540 </xs:restriction>
1540 </xs:simpleType>
1545 <xs:simpleType name="CL_Sex_WAHO_1.0_Type">
1545 <xs:restriction base="xs:token">
1545 <xs:enumeration value="M"/>
1545 <xs:enumeration value="F"/>
1545 </xs:restriction>
1545 </xs:simpleType>
1550 <xs:simpleType name="CL_Mechanism_WAHO_1.0_Type">
1550 <xs:restriction base="xs:token">
1550 <xs:enumeration value="PEPFAR"/>
1550 <xs:enumeration value="GFATM"/>
1555 <xs:enumeration value="OTHER"/>
1555 </xs:restriction>
1555 </xs:simpleType>
1560 <xs:simpleType name="periodType">
1560 <xs:restriction base="common:TimeRangeType"/>
1560 </xs:simpleType>
1560 <xs:complexType name="adxType">
1560 <xs:sequence maxOccurs="unbounded">
1560 <xs:element name="group" type="groupType"/>
1560 </xs:sequence>
1565 <xs:attribute name="exported" use="required" type="xs:dateTime"/>
1565 <xs:anyAttribute processContents="skip"/>
1565 </xs:complexType>
1570 <xs:complexType name="groupType">
1570 <xs:sequence maxOccurs="unbounded">
1570 <xs:element name="dataValue" type="DataValueType"/>
1570 </xs:sequence>
1575 <xs:attribute name="orgUnit" use="required" type="CL_OrgUnits_WAHO_1.0_Type"/>
1575 <xs:attribute name="period" use="required" type="periodType"/>
1575 <xs:attribute name="mechanism" type="CL_Mechanism_WAHO_1.0_Type" use="optional"/>
1575 <xs:anyAttribute processContents="skip"/>
1575 </xs:complexType>

```

```

1580 <xs:complexType name="DataValueType">
<xs:sequence maxOccurs="1" minOccurs="0">
<xs:element name="annotation"/>
</xs:sequence>
<xs:attribute name="dataElement" use="required" type="CL_DataElements_WAHO_1.0_Type"/>
<xs:attribute name="value" use="required" type="xs:decimal"/>
<xs:attribute name="sex" type="CL_Sex_WAHO_1.0_Type" use="optional"/>
<xs:attribute name="ageGroup" type="CL_AgeGroup_WAHO_1.0_Type" use="optional"/>
1585 <xs:anyAttribute processContents="skip"/>
</xs:complexType>
<xs:element name="adx" type="adxType"/>
</xs:schema>
    
```

Appendix 8G – (Informative) Sample ADX/XML data

1590 Current working copy available at

https://github.com/dhis2/adx/blob/master/IHE/samples/adx_data_sample1.xml

```

1595 <?xml version="1.0" encoding="UTF-8"?>
<adx xmlns="urn:ihe:qrph:adx:2015"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="urn:ihe:qrph:adx:2015 ../schema/adx_sample_generated.xsd"
  exported="2015-02-08T19:30:00Z">
1600 <group orgUnit="342" period="2015-01-01/P1M" dataSetComplete="true" mechanism="PEPFAR">
<dataValue dataElement="MAL01" value="32" />
<dataValue dataElement="MAL02" value="20" />
<dataValue dataElement="MAL04" value="10" ageGroup="under5" sex="M" />
<dataValue dataElement="MAL04" value="10" ageGroup="under5" sex="F" />
1605 <dataValue dataElement="MAL04" value="10" ageGroup="5andOver" sex="M"/>
<dataValue dataElement="MAL04" value="10" ageGroup="5andOver" sex="F"/>
</group>
<group orgUnit="342" period="2015-01-01/P1M" mechanism="OTHER" comment="Imported from facility system">
1610 <dataValue dataElement="MAL01" value="32" />
<dataValue dataElement="MAL02" value="20" />
<dataValue dataElement="MAL03" value="0" />
<annotation>Some qualifying text here on the datavalue</annotation>
</dataValue>
1615 <dataValue dataElement="MAL04" value="10" ageGroup="under5" sex="M" />
<dataValue dataElement="MAL04" value="10" ageGroup="under5" sex="F" />
<dataValue dataElement="MAL04" value="10" ageGroup="5andOver" sex="M"/>
    
```

```
<dataValue dataElement="MAL04" value="10" ageGroup="5andOver" sex="F"/>  
</group>  
</adx>
```

1620 **Appendix 8H – (Informative) Formatting of times and time intervals in ADX**

1625 The SDMX v2.1 DSD ObservationalTimePeriod data type allows a variety of formats for specifying time periods, with the result that there are several equivalent ways of expressing the same period. In the interest of greater and easier interoperability, the normative transform in Appendix 8B restricts the available options to an SDMX ObservationalTimePeriod. This can be either a `xs:dateTime`, or a `com:TimeRange`, as specified under the `str:TimeDimension` element of the DSD.

`xs:dateTime` is formatted as `yyyy-mm-ddThh:mm:sszzzzz`, where:

`yyyy` is the year

1630 `mm` is the month (01-12)

`dd` is the day of the month (01-31)

`T` indicates the time (required)

`hh` is the hours

`mm` is the minutes

1635 `ss` is the seconds optionally followed by `'.'` and fractional seconds

`zzzzzz` is the optional time zone: a `'+'` or `'-'` followed by the `hh:mm` (hours and minutes) offset from UTC, or `Z` to indicate UTC.

All parts are required except the fractional seconds and the time zone.

1640 Examples:

2016-01-01T00:00:00 Midnight on January 1, 2016

2016-01-01T12:00:00 Noon on January 1, 2016

2016-01-01T12:00:12.34Z Noon and 12.34 seconds on January 1, 2016, UTC

2016-01-01T12:00:00+03:00 Noon on January 1, 2016, three hours ahead of UTC

`com:TimeRange` is modelled after `(xs:dateTime OR xs:date)/xs:duration`.

- `xs:dateTime` is as described above.
 - `xs:date` follows the same rules as `xs:dateTime` except that the elements `Thh:mm:ss` are not present.
- 1645

- `xs:duration` is of the form P[n]Y[n]M[n]DT[n]H[n]M[n]S, where n is the number of units and the letters have the meaning:

P - Period indicator (always present for durations)

Y - Years (follows the number of years)

1650 M - Months (follows the number of months)

D - Days (follows the number of days)

T - Time indicator (preceding any of the following):

H - Hours (follows the number of hours)

M - Minutes (follows the number of minutes)

1655 S - Seconds (follows the number of seconds)

Examples:

2016-01-01/P1Y One-year period starting on 2016-01-01

2016-04-01/P1Y One-year period starting on 2016-04-01

2016-07-01/P6M Six-month period starting on 2016-07-01

2016-03-01/P1M One-month period starting on 2016-03-01

2016-01-03/P7D One-week period starting on 2016-01-03

2016-01-01/P1Y6M A year and six month period starting on 2016-01-01

2016-01-01T12:00:00/PT1H30M A period of 1 hour and 30 minutes starting on 2016-01-01 at 12:00 noon

Volume 3 Namespace Additions

<i>Add the following terms to the IHE Namespace:</i>
--

1660 None

1665

Volume 4 – National Extensions

Add appropriate Country section

Not applicable